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DEPARTMENT OF THE INTERIOR

UNITED STATES BUREAU OF MINES
JOHN W. FINCH, DIRECTOR

INFORMATION CIRCULAR

MINE SAFETY DECISION 27

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DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

Mine Safety Decision 27 [1]

By the Mine Safety Board

Mining officials, as well as members of the Bureau of Mines staff, in their efforts to make mining safer are confronted from time to time with complicated problems concerning solution of which there is a diversity of opinion. To reduce these differences of opinion as much as possible and to obtain a generally acceptable decision on any mine-safety question, the Director of the U.S. Bureau of Mines established the Mine Safety Board on June 1, 1924 -

> * * * to consider questions arising within any divisions of the Bureau that require a definition of the Bureau's collective opinion as to safety practices, safety devices, or safety methods for underground operations or open-pit mining. The approved[2] decisions shall form the basis of teaching and policy for the Bureau.

Some of the 27 decisions reached by this board and approved by the Director to date relate strictly to coal mining; others to metal or nonmetallic mining; and some, like Decision 27, which follows, relate to any kind of mining in which shafts are used. The first 25 decisions were published July 1933 in Information Circular 6732 with explanatory text; Decision 26, Reducing the Amount of Gas in Mines and Tunnels, was issued as a separate publication.

Mine Safety Decision 27, Relating to the Construction of Shaft Linings[3]

In the interest of safety the United States Bureau of Mines recommends:

1. That the lining of all mine shafts shall be fireproof.[4]
2. That the lining, so far as feasible, be smooth and without projections or recesses so as to prevent:
   - (a) Turbulence of the ventilating current;
   - (b) Accumulation of dust, especially inflammable dust;
   - (c) Lodgment of rock or other material.

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[1] The Bureau of Mines will welcome reprinting of this paper provided the following footnote acknowledgment is used: "Reprinted from U.S. Bureau of Mines Information Circular 6859."

[2] Approved by the Director of the Bureau of Mines.

[3] Approved July 13, 1935, by JOHN W. FINCH, Director.

[4] Decision 7, sec. 2, recommends that the "main intake shaft lining be of fireproof construction."

Explanatory Notes

The Bureau of Mines recommended in section 2, Decision 7, "that the main intake shaft lining be of fireproof construction and there be a minimum amount of inflammable material in or adjacent to the shaft." This is the general practice in European mines where most shaft linings are brick or concrete and are circular or elliptical in cross-section. For long-lived shafts such form and noncombustible construction are highly desirable because they are strong and permanent and offer the minimum resistance to air flow.

In the United States, however, nearly all shafts are wood-lined and rectangular in cross-section; they are rarely of fireproof construction, except in a few metal mines and coal mines or where such construction is required by State coal-mining regulations, as in Illinois[5] since the Cherry mine fire disaster.

As many disastrous fires in both metal and coal mines have occurred in or connected with wood-lined shafts it is evident that in the interest of safety and fire prevention, as well as for permanence, all main shaft linings should be constructed of incombustible material. If, however, wooden lining is used it should be made fire-resisting, as by covering with cement-sand coating or gunite preferably reinforced with wire mesh.

Most wooden shaft linings are made of frames or horizontal sets of squared timbers placed 3 to 5 feet (vertically) apart, with plank lagging behind the frames in contact with the rock or ground; but when the strata appear solid the lagging sometimes is omitted. In either case the timber sets project into the shaft 6 to 8 inches, or even 12 inches in heavy ground, in effect making wide shelves. The results are:

1. Scientific tests show that much ventilating power is lost through air turbulence where an air current traverses a rough duct compared with traversing a smooth lined passageway.

2. Dust collects on these shaft projections. The dust in some cases may be highly inflammable, such as coal dust and pyritic dust carried by air currents or otherwise in the shaft. Such dust, when in a dense cloud, has propagated many explosions from ignitions by open lights or electric "shorts" or arcs in the surface tipple building, in the mine below, or, in a few instances, within the shaft itself.

3. Projecting frames catch pieces of rock or coal - often large - falling from cages or skips or from the surface. These loose pieces may be dislodged by air currents, by the falling of other pieces, or by some shock and may drop on persons on hoisting cages or at the shaft landings.

If wooden timbering is used a relatively smooth lining may be obtained by using squared timbers of appropriate strength laid log-cabin fashion "skin to skin."

5/ See "Fire-Fighting Equipment in Coal Mines" (effective July 1, 1910) Illinois General Mining Laws (Sec. 6, a and b).

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